FRUIT BELT REDEVELOPMENT OF CARLTON STREET FROM MICHIGAN AVENUE TO JEFFERSON AVENUE NYSDOT PIN 5759.40

CITY OF BUFFALO
ERIE COUNTY, NEW YORK

POROUS PAVEMENT TECHNICAL MEMORANDUM

Prepared by:

TVGA CONSULTANTS

620 Main Street
Buffalo, NY 14202-1906
Phone: 716-849-8739
Fax: 716-856-0981

2010.0374.00 July 2013

TABLE OF CONTENTS

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This document has been prepared by TVGA Consultants to describe the porous pavement treatment that will be implemented to mitigate negative impacts from stormwater runoff within the Carlton Street Redevelopment area. The project area is shown in Appendix A – Location Map.

I. INTRODUCTION

A. Project Description

The project involves rehabilitation of Carlton Street between Michigan Avenue and Jefferson Avenue within the City of Buffalo, New York. The existing pavement, curbs, and sidewalk are in poor condition throughout the project corridor. The proposed project involves a mill and overlay of the existing pavement, replacement of curbing, replacement of sidewalks and installation of ADA compliant curb ramps, replacement of driveway aprons, replacement of signage and striping including safety upgrades, installation of new decorative street lighting, and landscaping improvements. Additionally, the existing roadway will be reduced in width by 2.0 linear feet along the south side of the roadway in an attempt to preserve several old growth elm trees residing in the south side snow storage area.

Porous pavement will be installed along Carlton Street between Orange Street and Rose Street to reduce the stormwater runoff entering the combined sewer system. The pervious asphalt in this section accounts for 43% of the project corridor as shown in Appendix A – Location Map.

B. Existing (Pre-Developed) On-Site Conditions

The project corridor consists of primarily residential properties. Roswell Park Cancer Institute is located at the west end of the project (Michigan Avenue) and Marva J. Daniel Futures Academy (School #37) is located on the south side of Carlton Street midway through the corridor (between Orange and Peach Streets), as shown in Appendix B. The project area generally drains to the south east. The corridor is not located adjacent to any known stormwater hotspots.

Soil borings and pavement cores of the project corridor were collected by Quality Inspection Service, Inc on August 2, 2012. Two soil borings (B-3 and B-4) were taken in the northern snow storage area within the limits of the porous pavement. Both borings found fine sand 3.5 feet below the surface. At a depth of 6 feet below the surface, both borings had a combination of clayey silt, and silty clay. The groundwater surface elevation was not reached at a depth of 8 feet at either location.

Two pavement cores were taken within the porous pavement limits. The first core (C-2), taken approximately 100 feet east of Orange Street, consisted of asphalt surface on a concrete subbase. The concrete subbase was laid on fine sand to a final drilling depth of 3 feet below the surface. The second pavement core (C-3), taken approximately 55 feet west of Rose Street, consisted of 3.5 inches of asphalt followed by gravel to a depth of 2 feet. Below the gravel subbase is fine sand and silty clay, to a final drilling depth of 3 feet. The boring logs for the porous pavement section are provided in Appendix D.

C. Proposed (Post-Developed) On-Site Conditions

The proposed project includes the rehabilitation of the existing roadway, curbs, sidewalks, and lighting, including four blocks of porous pavement. The porous pavement section will utilize 6 inches of pervious asphalt, a biaxial geogrid for stability, and 12 inches of gravel subbase for stormwater storage. Within 3 feet of the proposed curb line, the gravel subbase storage area will be extended to 3 feet in depth, and include an 8 inch perforated underdrain to convey un-infiltrated stormwater to the combined sewer system. Appendix C – MD-3 shows the proposed pervious pavement features.

D. Environmental Impact

Correspondence with the New York State Department of Environmental Conservation dated June 13, 2011 confirmed that there are "no records of rare or state listed animals or plants, significant natural communities or other significant habitats, on or in the immediate vicinity" of this project site. No further investigation or coordination regarding protected plants and animals is required.

Correspondence with the New York State Office of Parks, Recreation and Historic Preservation (SHPO) dated May 27, 2011 stated that "it is SHPO's opinion that your project will have No Effect upon cultural resources in or eligible for inclusion in the National Register's of Historic Places." No further coordination with SHPO is required.

II. POROUS PAVEMENT CAPTURE AREA AND CAPACITY

A. Capture Area of Porous Pavement

The capture area of the porous pavement was determined to be 5.90 acres, using project topographic survey, United States Department of Interior Geologic Survey (USGS) topographic mapping, and proposed project reconstruction plans.

A review of the available USGS topographic mapping determined that the stormwater generally drains to the south east throughout the corridor. The USGS topographic mapping is shown in Appendix A – Location Map. A profile of Carlton Street within the project limits shows that the corridor drains eastward, as shown in Appendix B – Drainage Area Plans.

It was assumed that none of the structures in the capture area have roof drains connected directly to the combined sewer, and that all roof runoff will be conveyed to the porous pavement.

B. Porous Pavement Sizing and Capacity

Review of the soil boring and pavement cores in Appendix D reveal a general presence of fine sand at a depth of 3 to 3.5 feet. This sand layer is ideal for infiltration of rainfall into the native soils.

Below the pervious asphalt, the porous pavement will be supported on 12 inches of gravel subbase for stormwater storage. Additional storage will be provided within 3 feet of the proposed north and south curb lines, providing an average gravel subbase depth of 1.74 feet. Per New York State Stormwater Management Design Manual (August 2010) guidance, the required porous surface area for this capture area is 9,782 square-feet. Calculations for the porous pavement sizing are included in Appendix E.

The provided porous pavement area will cover 38,280 square-feet of roadway. The gravel subbase reservoir provided is capable of storing almost 4 times the required stormwater volume.

Table II-1: Porous Pavement Sizing and Capacity

	Required	Provided
Porous Pavement Area	9,782 SF	38,280 SF
Storage Volume	6,808 CF	26,676 CF

III. PERVIOUS ASPHALT MAINTENANCE

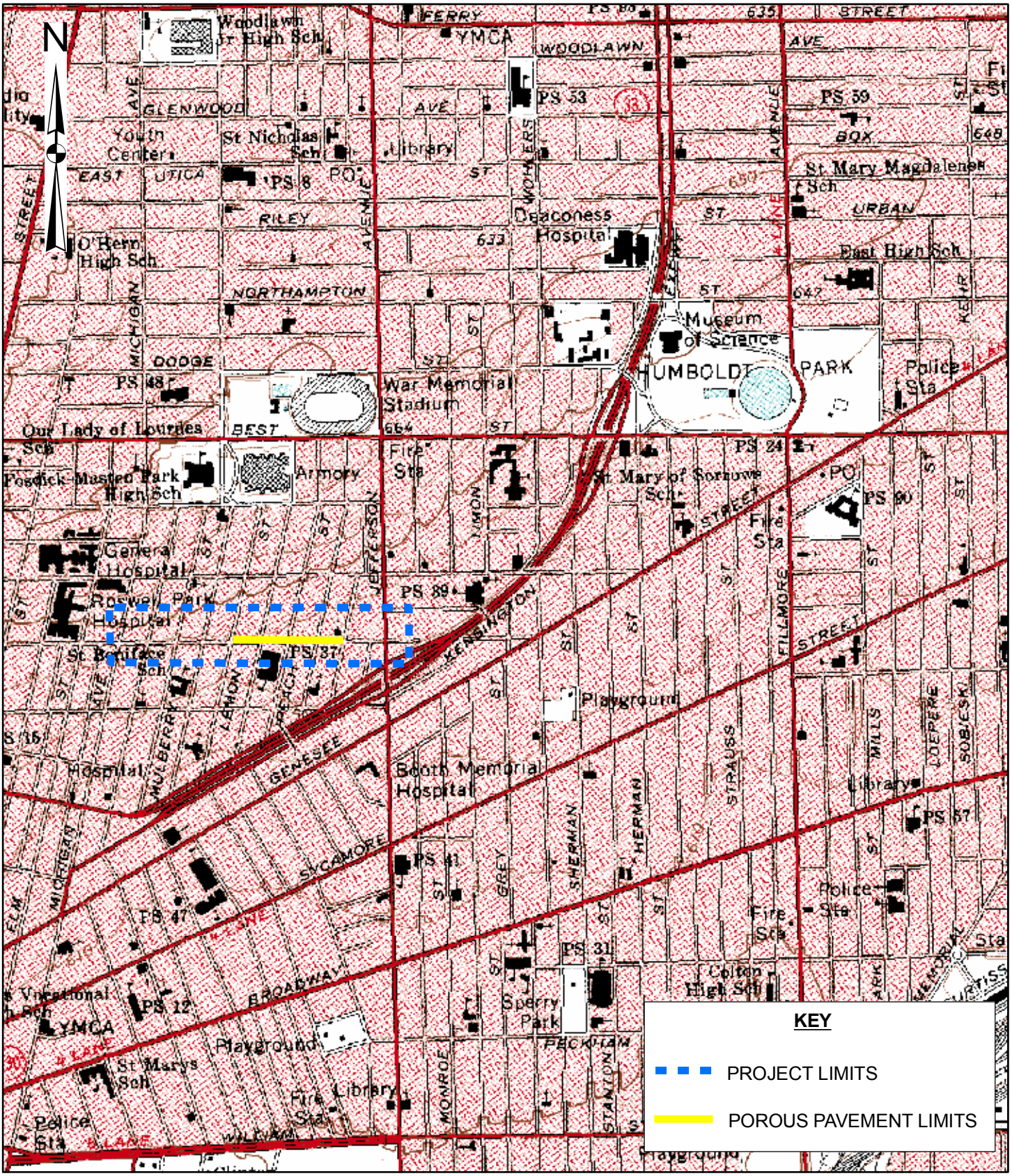
All porous pavements, including pervious asphalt, are highly susceptible to clogging and must be properly maintained to maintain infiltration rates and the long term permeability of the pavement. It is critical that sand and cinders are not used as deicing agents in porous pavement areas as they will quickly clog the pavement pores. The New York State Stormwater Management Design Manual (August 2010) recommends the following maintenance activities for permeable paving.

Table III-1: Pervious Asphalt Maintenance Schedule

Activity	**Frequency**
Ensure that paving area is clean of debris	monthly
Ensure that paving area dewaters between storms	monthly and after storm >0.5" rainfall
Ensure that the area is clean of sediments	monthly
Mow upland and adjacent areas	as needed
Vacuum sweep to keep surface free of sediments	3 - 4 times a year
Inspect the surface for deterioration	annually

APPENDIX A

LOCATION MAP



Source: NYS GIS Clearinghouse, Buffalo NE Quandrangle, [http://gis.ny.gov/gisdata/quads/drg24/usgspreview/index.cfm?code=o42078h7]

PROJECT LOCATION MAP

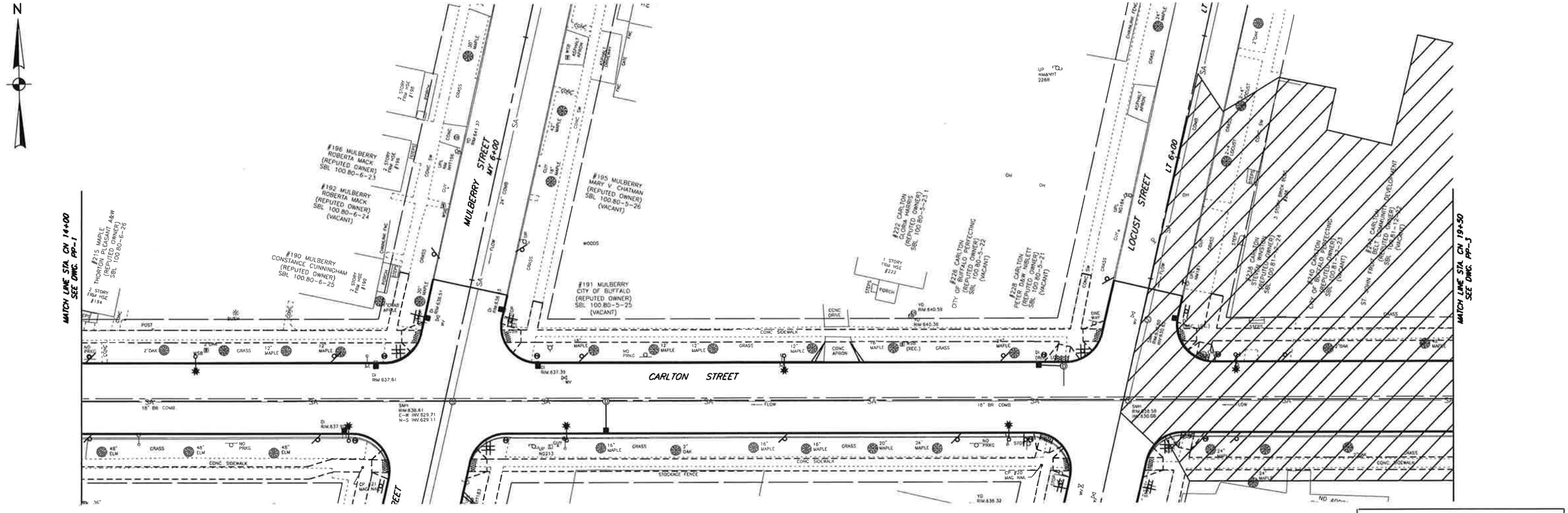
TVGA CONSULTANTS
620 MAIN STREET
BUFFALO NY 14202
P. 716.849.8739
F. 716.856.0981
www.tvga.com

CARLTON STREET
BETWEEN MICHIGAN AVENUE AND JEFFERSON AVENUE

PROJECT NO. 2010.0374.00	1 inch = 1,300 feet	JULY 2013	FIGURE NO. 1

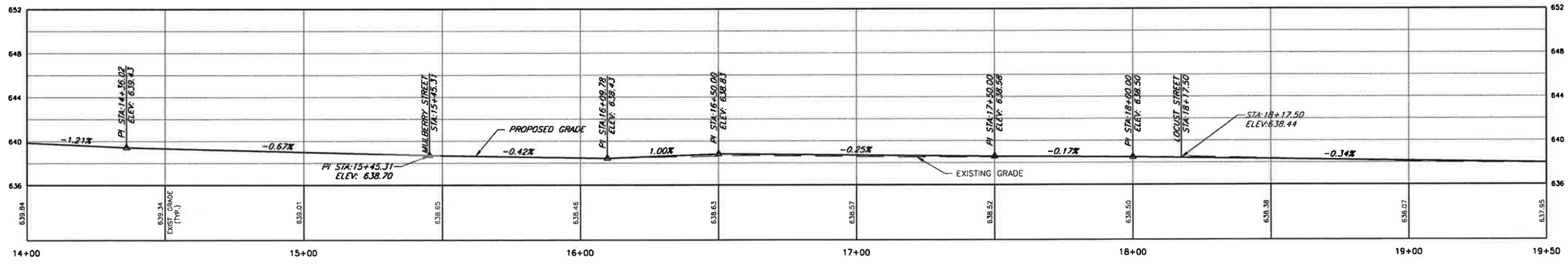
APPENDIX B

DRAINAGE AREA PLANS



PLAN
SCALE: A

PROPOSED GRADES	B.W.	640.77	640.24	639.83	(SEE DWG. IG-2)	639.30	639.66	639.54	639.41	(SEE DWG. IG-2)	(SEE DWG. IG-2)	639.07	638.90
	T.C.	640.16 (7" REVEAL)	639.63 (7" REVEAL)	639.22 (6" REVEAL)	(SEE DWG. IG-2)	638.69 (6" REVEAL)	639.05 (6" REVEAL)	638.93 (6" REVEAL)	638.80 (6" REVEAL)	(SEE DWG. IG-2)	(SEE DWG. IG-2)	638.46 (7" REVEAL)	638.29 (7" REVEAL)
	B.C.	639.58	639.05	638.72	(SEE DWG. IG-2)	638.19	638.55	638.43	638.30	(SEE DWG. IG-2)	(SEE DWG. IG-2)	637.88	637.71
	℄	639.86	639.33	639.00	638.68	638.47	638.83	638.71	638.58	638.54	638.39	638.16	637.99
	B.C.	639.58	639.05	638.72	(SEE DWG. IG-2)	638.19	638.55	638.43	638.30	(SEE DWG. IG-2)	638.11	637.88	637.71
	T.C.	640.00 (5" REVEAL)	639.47 (5" REVEAL)	639.14 (5" REVEAL)	(SEE DWG. IG-2)	638.69 (6" REVEAL)	638.80 (3" REVEAL)	638.68 (3" REVEAL)	638.55 (3" REVEAL)	(SEE DWG. IG-2)	638.44 (4" REVEAL)	638.21 (4" REVEAL)	638.04 (4" REVEAL)
	B.W.	640.23	639.70	639.34	(SEE DWG. IG-2)	638.90	639.01	638.89	638.76	(SEE DWG. IG-2)	638.65	638.42	638.25



PROFILE
HORIZONTAL SCALE: A
VERTICAL SCALE: B

5 0 5 10 FT.
SCALE B
20 0 20 40 FT.
SCALE A

NOTES:

1. REFER TO DWG'S LL-1 TO LL-5 FOR PROPOSED LANDSCAPING AND STREET LIGHTING PLAN AND DETAILS.
2. REFER TO DWG'S W-1 TO W-5 FOR PROPOSED WATERMAIN PLANS AND DETAILS.
3. REFER TO DWG'S SR-1 TO SR-5 AND SPM-1 TO SPM-5 FOR SIGN REMOVAL AND PROPOSED SIGN AND STRIPING, RESPECTIVELY.
4. REFER TO DWG'S MT-1 AND MD-3 FOR LIMITS AND DETAILS OF DRIVEWAY, SIDEWALK, SIDEWALK CURB RAMPS AND CURB INSTALLATION AND REPLACEMENT.

TVGA CONSULTANTS
ENGINEERING · LAND SURVEY
MAPPING · ENVIRONMENTAL
620 MAIN STREET
BUFFALO, NEW YORK 14202-1906
P. 716.849.8729
F. 716.856.0981 (www.tvga.com)

REV.

TITLE **CARLTON STREET RECONSTRUCTION**
DRAINAGE AREA STA. CN14+00 TO STA. CN19+50

DWG. NO. **DA-2**

COMMISSIONER STEVEN STEPNIAK
DEPARTMENT OF PUBLIC WORKS
THE DIVISION OF ENGINEERING, PARKS AND STREETS
CITY OF BUFFALO, NEW YORK

SCALE AS SHOWN
DRAWN BY TJB
CHECKED ETF

DATE 01/2013
FIELD BK.
PROJ. NO. 2010.0374.00
SHEET NO. 2

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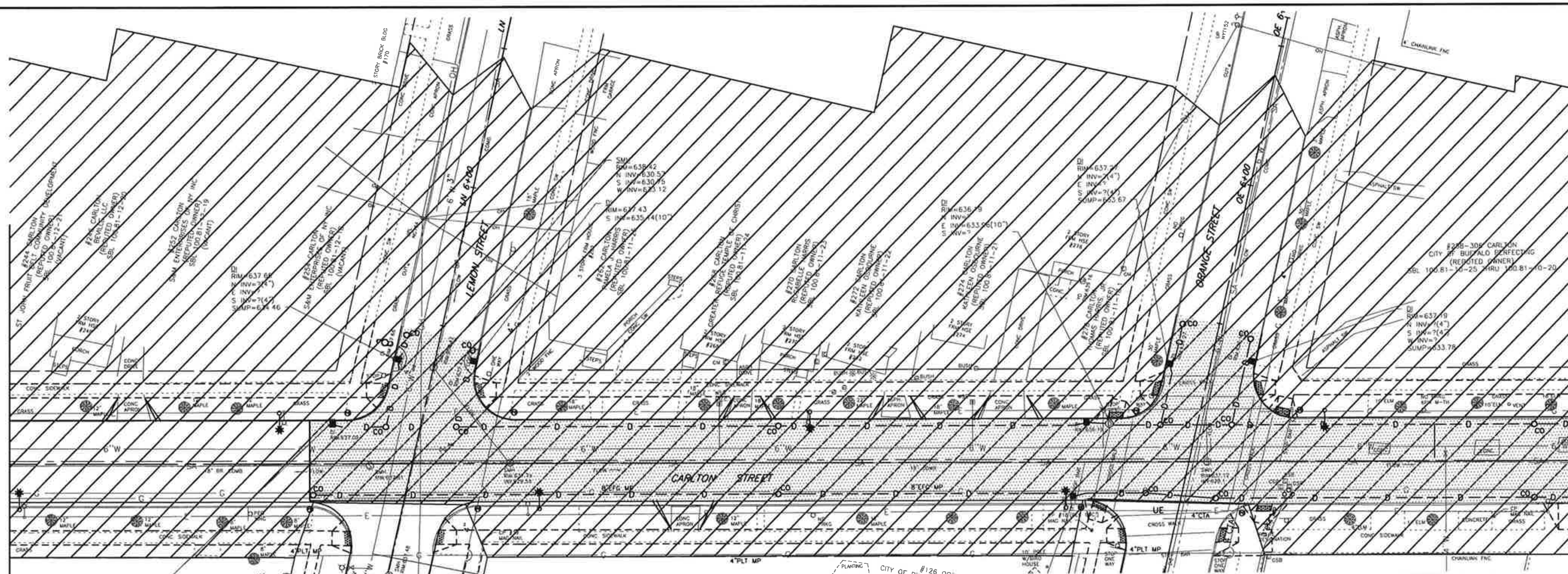

PLAN
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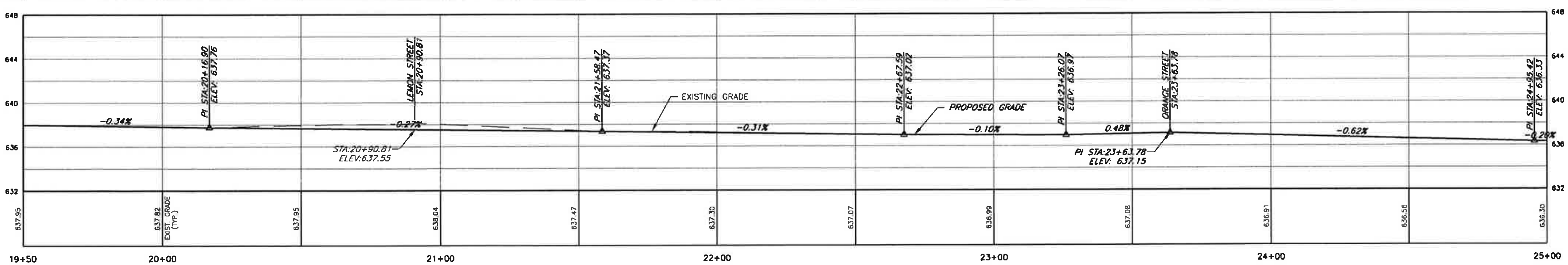
PROPOSED GRADES B.W.	638.90	638.72	638.58	(SEE DWG. IG-2)	638.01	637.86	637.70	637.61	(SEE DWG. IG-2)	(SEE DWG. IG-2)	637.50	637.21
T.C.	638.29 (7" REVEAL)	638.11 (7" REVEAL)	637.97 (7" REVEAL)	(SEE DWG. IG-2)	637.61 (6" REVEAL)	637.46 (6" REVEAL)	637.30 (6" REVEAL)	637.21 (6" REVEAL)	(SEE DWG. IG-2)	(SEE DWG. IG-2)	636.89 (7" REVEAL)	636.60 (7" REVEAL)
B.C.	637.71	637.53	637.39	(SEE DWG. IG-2)	637.11	636.96	636.80	636.71	(SEE DWG. IG-2)	(SEE DWG. IG-2)	636.31	636.02
℄	637.99	637.81	637.67	637.53	637.39	637.24	637.08	636.99	637.08	636.92	636.61	636.32
B.C.	637.71	637.53	637.39	(SEE DWG. IG-2)	637.11	636.96	636.80	636.71	(SEE DWG. IG-2)	636.62	636.31	636.02
T.C.	638.04 (4" REVEAL)	637.95 (5" REVEAL)	637.81 (5" REVEAL)	(SEE DWG. IG-2)	637.61 (6" REVEAL)	637.46 (6" REVEAL)	637.30 (6" REVEAL)	637.21 (6" REVEAL)	(SEE DWG. IG-2)	637.12 (6" REVEAL)	636.81 (6" REVEAL)	636.52 (6" REVEAL)
B.W.	638.25	638.15	638.01	(SEE DWG. IG-2)	637.82	637.67	637.51	637.42	(SEE DWG. IG-2)	XX	XX	XX



PROFILE
HORIZONTAL SCALE: A
VERTICAL SCALE: B

5 0 5 10 FT. SCALE B

20 0 20 40 FT. SCALE A

NOTES:

1. REFER TO DWG'S LL-1 TO LL-5 FOR PROPOSED LANDSCAPING AND STREET LIGHTING PLAN AND DETAILS.
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3. REFER TO DWG'S SR-1 TO SR-5 AND SPM-1 TO SPM-5 FOR SIGN REMOVAL AND PROPOSED SIGN AND STRIPING, RESPECTIVELY.
4. REFER TO DWG'S MT-1 AND MD-3 FOR LIMITS AND DETAILS OF DRIVEWAY, SIDEWALK, SIDEWALK CURB RAMPS AND CURB INSTALLATION AND REPLACEMENT.
5. REFER TO DWG. LL-2 AND LL-5 FOR FURTHER DETAILS OF LIGHT SYSTEM METERED SERVICE CONNECTION.
6. CLEANOUTS, INCLUDING BRASS THREADED PLUG CAP WITH RECESSED NUT, SHALL BE INCLUDED IN THE COST OF ITEM 605.1603. THE 6 INCH VERTICAL RISER FOR EACH CLEANOUT SHALL BE MEASURED FROM THE BRASS RIM TO THE CONNECTION AT THE 8" UNDERDRAIN, AND ADDED THE QUANTITY FOR ITEM 605.1603.

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REV.
⚠ REVISED PERVIOUS PAVEMENT LIMITS 07-17-13 GMW

TITLE **CARLTON STREET RECONSTRUCTION**
DRAINAGE AREA STA. CN19+50 TO STA. CN25+00

DWG. NO. **DA-3**

COMMISSIONER STEVEN STEPNIAK
DEPARTMENT OF PUBLIC WORKS
THE DIVISION OF ENGINEERING, PARKS AND STREETS
CITY OF BUFFALO, NEW YORK

SCALE AS SHOWN
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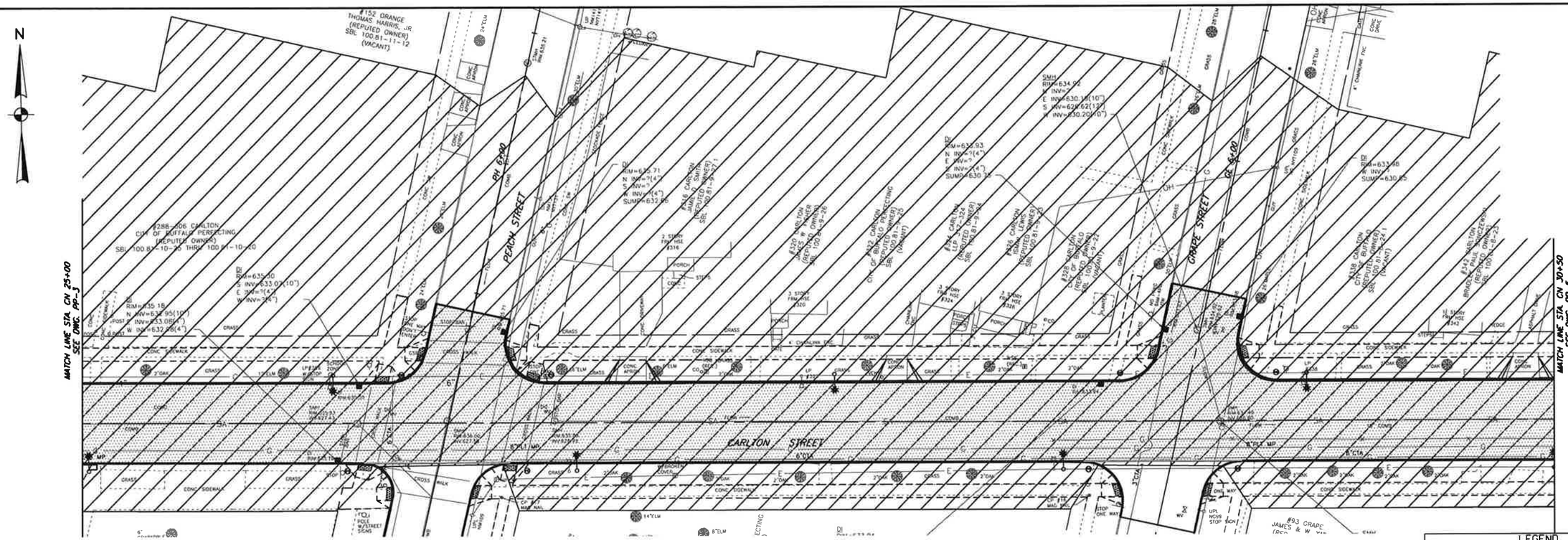
DATE 01/2013
FIELD BK.
PROJ. NO. 2010.0374.00
SHEET NO. 3



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SCALE: A

PROPOSED GRADES	B.W.	637.21	637.11	636.93	(SEE DWG. IG-2)	636.49	636.14	635.84	635.57	(SEE DWG. IG-2)	(SEE DWG. IG-2)	634.90	634.27
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	B.C.	636.02	635.92	635.82	(SEE DWG. IG-2)	635.30	634.95	634.65	634.38	(SEE DWG. IG-2)	(SEE DWG. IG-2)	633.79	633.50
	℄	636.32	636.22	636.12	635.96	635.60	635.25	634.95	634.68	634.61	634.37	634.09	633.80
	B.C.	636.02	635.92	635.82	(SEE DWG. IG-2)	635.30	634.95	634.65	634.38	(SEE DWG. IG-2)	634.07	633.79	633.50
	T.C.	636.52 (6" REVEAL)	636.42 (6" REVEAL)	636.32 (6" REVEAL)	(SEE DWG. IG-2)	635.80 (6" REVEAL)	635.45 (6" REVEAL)	635.15 (6" REVEAL)	634.88 (6" REVEAL)	(SEE DWG. IG-2)	634.57 (6" REVEAL)	634.29 (6" REVEAL)	634.00 (6" REVEAL)
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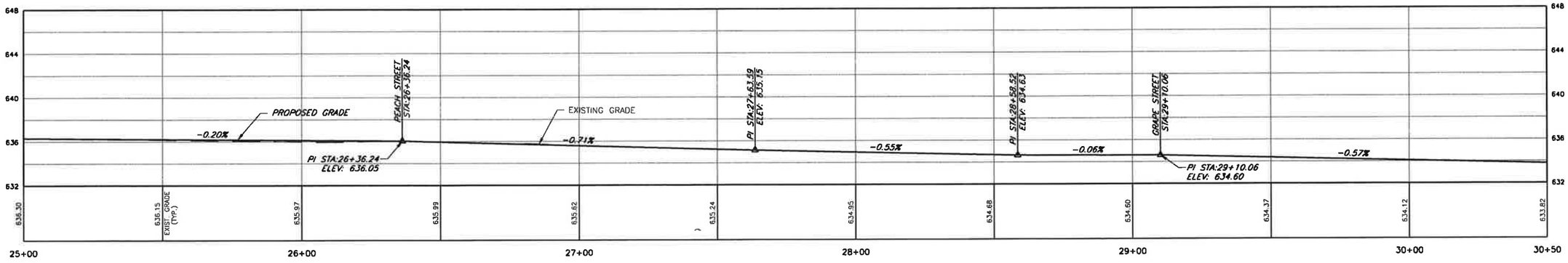

PROFILE
HORIZONTAL SCALE: A
VERTICAL SCALE: B

NOTES:

1. REFER TO DWG'S LL-1 TO LL-5 FOR PROPOSED LANDSCAPING AND STREET LIGHTING PLAN AND DETAILS.
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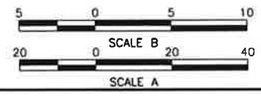
4. REFER TO DWG'S MT-1 AND MD-3 FOR LIMITS AND DETAILS OF DRIVEWAY, SIDEWALK, SIDEWALK CURB RAMPS AND CURB INSTALLATION AND REPLACEMENT.
5. CLEANOUTS, INCLUDING BRASS THREADED PLUG CAP WITH RECESSED NUT, SHALL BE INCLUDED IN THE COST OF ITEM 605.1603. THE 6 INCH VERTICAL RISER FOR EACH CLEANOUT SHALL BE MEASURED FROM THE BRASS RIM TO THE CONNECTION AT THE 8" UNDERDRAIN, AND ADDED THE QUANTITY FOR ITEM 605.1603.
6. DUE TO THE EXISTENCE OF UTILITIES (GAS AND ELECTRIC LINES) IN THE VICINITY OF THE PROPOSED 8" UNDERDRAIN BETWEEN PEACH AND BEECH STREET ALONG THE CURB LINE, IT MAY BE NECESSARY TO FIELD ADJUST THE LOCATION OF THIS PIPE. THE LATERAL LOCATION OF THE 8" UNDERDRAIN PIPE SHALL BE COORDINATED WITH THE BUFFALO SEWER AUTHORITY (BSA) ENGINEERING DEPARTMENT (716-851-4664) AFTER UTILITY LOCATIONS HAVE BEEN VERIFIED.



LEGEND

- STORMWATER CAPTURE AREA
- PROPOSED PERVIOUS PAVEMENT/ INFILTRATION AREA

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BUFFALO, NEW YORK 14202-1906
P. 716.849.8739
F. 716.854.0981 (www.tvga.com)

REV.

TITLE
CARLTON STREET RECONSTRUCTION
DRAINAGE AREA STA. CN25+00 TO STA. CN30+50

DWG. NO.
DA-4

COMMISSIONER STEVEN STEPNIAK
DEPARTMENT OF PUBLIC WORKS
THE DIVISION OF ENGINEERING, PARKS AND STREETS
CITY OF BUFFALO, NEW YORK

SCALE
AS SHOWN

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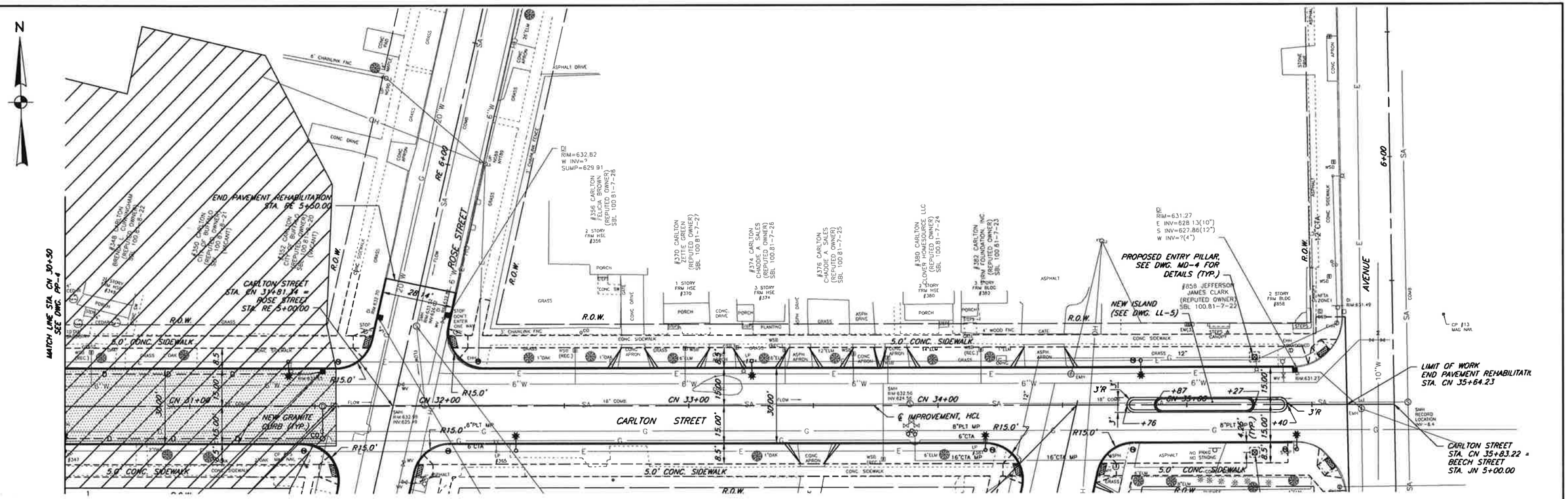
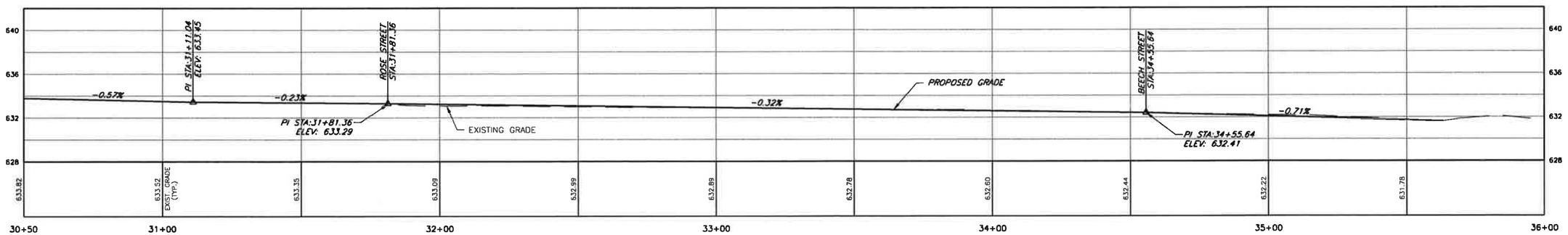
DATE 01/2013
FIELD BK.
PROJ. NO. 2010.0374.00
SHEET NO. 4





LEGEND

STORMWATER CAPTURE AREA
PERVIOUS ASPHALT

PLAN

SCALE: A

PROPOSED GRADES												
B.W.	634.27	633.99	633.83	(SEE DWG. IG-5	633.54	633.38	633.22	633.06	632.90	632.56	(SEE DWG. IG-5)
T.C.	634.00 (6" REVEAL)	633.72 (6" REVEAL)	633.56 (6" REVEAL)	(SEE DWG. IG-5)	633.27 (6" REVEAL)	633.11 (6" REVEAL)	632.95 (6" REVEAL)	632.79 (6" REVEAL)	632.63 (6" REVEAL)	632.29 (6" REVEAL)	(SEE DWG. IG-5)
B.C.	633.50	633.22	633.06	(SEE DWG. IG-5)	632.77	632.61	632.45	632.29	632.13	631.79	(SEE DWG. IG-5)
℄	633.80	633.52	633.36	633.23	633.07	632.91	632.75	632.59	632.43	632.09	631.74
B.C.	633.50	633.22	(SEE DWG. IG-5)	(SEE DWG. IG-5)	632.77	632.61	632.45	632.29	(SEE DWG. IG-5)	631.79	(SEE DWG. IG-5)
T.C.	634.00 (6" REVEAL)	633.72 (6" REVEAL)	(SEE DWG. IG-5)	(SEE DWG. IG-5)	633.10 (4" REVEAL)	632.94 (4" REVEAL)	632.78 (4" REVEAL)	632.62 (4" REVEAL)	(SEE DWG. IG-5)	632.29 (6" REVEAL)	(SEE DWG. IG-5)
B.W.	634.19	633.91	(SEE DWG. IG-5)	(SEE DWG. IG-5)	633.29	633.13	632.97	632.81	(SEE DWG. IG-5)	632.73	(SEE DWG. IG-5)

NOTES:

1. REFER TO DWG'S LL-1 TO LL-5 FOR PROPOSED LANDSCAPING AND STREET LIGHTING PLAN AND DETAILS.
2. REFER TO DWG'S W-1 TO W-5 FOR PROPOSED WATERMAIN PLANS AND DETAILS.
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4. REFER TO DWG'S MT-1 AND MD-3 FOR LIMITS AND DETAILS OF DRIVEWAY, SIDEWALK, SIDEWALK CURB RAMPS AND CURB INSTALLATION AND REPLACEMENT.
5. CLEANOUTS, INCLUDING BRASS THREADED PLUG CAP WITH RECESSED NUT, SHALL BE INCLUDED IN THE COST OF ITEM 605.1603. THE 6 INCH VERTICAL RISER FOR EACH CLEANOUT SHALL BE MEASURED FROM THE BRASS RIM TO THE CONNECTION AT THE 8" UNDERDRAIN, AND ADDED THE QUANTITY FOR ITEM 605.1603.
6. DUE TO THE EXISTENCE OF UTILITIES (GAS AND ELECTRIC LINES) IN THE VICINITY OF THE PROPOSED 8" UNDERDRAIN BETWEEN PEACH AND BEECH STREET ALONG THE CURB LINE, IT MAY BE NECESSARY TO FIELD ADJUST THE LOCATION OF THIS PIPE. THE LATERAL LOCATION OF THE 8" UNDERDRAIN PIPE SHALL BE COORDINATED WITH THE BUFFALO SEWER AUTHORITY (BSA) ENGINEERING DEPARTMENT (716-851-4664) AFTER UTILITY LOCATIONS HAVE BEEN VERIFIED.

PROFILE

HORIZONTAL SCALE: A
VERTICAL SCALE: B

5 0 5 10 FT.
SCALE B
20 0 20 40 FT.
SCALE A

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P. 716.849.8739 F. 716.856.0981 (www.tvga.com)

REV.
⚠ REVISED PERVIOUS PAVEMENT LIMITS 07-17-13 GMW

TITLE **CARLTON STREET RECONSTRUCTION**
DRAINAGE AREA
STA. CN30+50 TO STA. CN36+00

DWG. NO. **DA-5**

COMMISSIONER STEVEN STEPNIAK
DEPARTMENT OF PUBLIC WORKS
THE DIVISION OF ENGINEERING, PARKS AND STREETS
CITY OF BUFFALO, NEW YORK

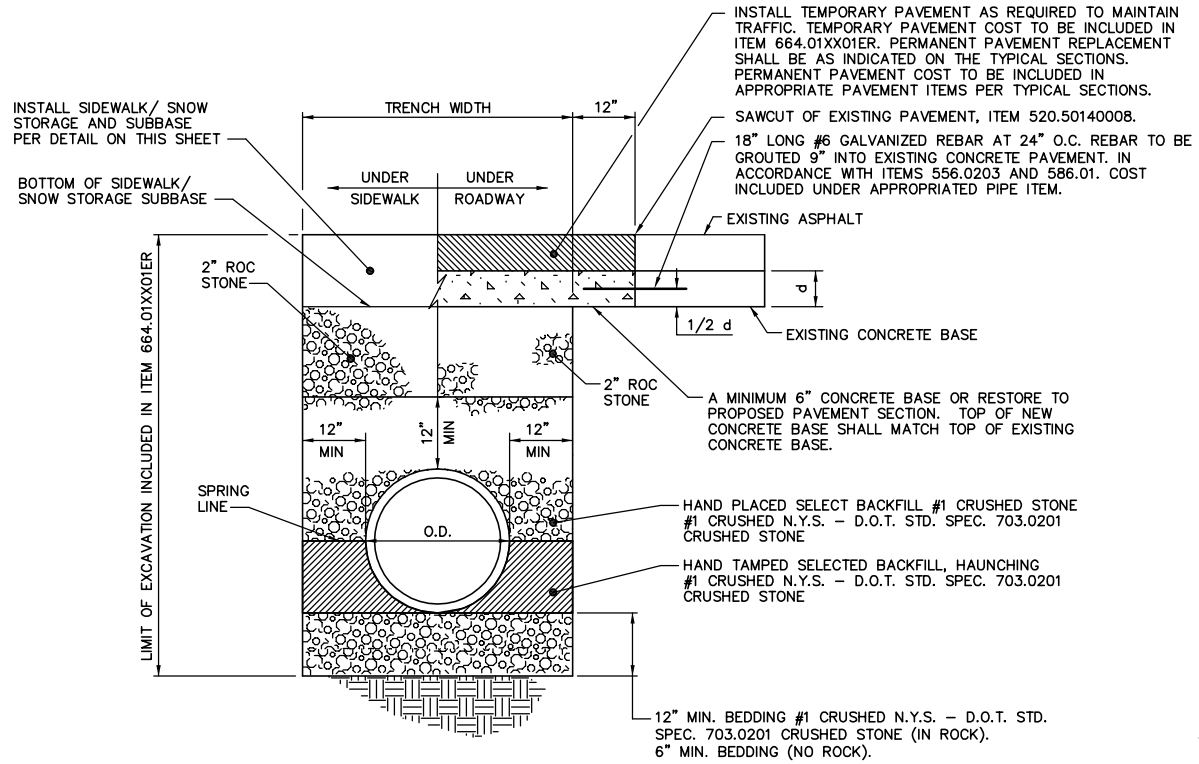
SCALE AS SHOWN
DRAWN BY TJB
CHECKED GMW

DATE 01/2013
FIELD BK.
PROJ. NO. 2010.0374.00
SHEET NO. 5

File: N:\2010 Projects\2010.0374.00 Fruit Belt Redevelopment\Engineering\CADD - Carlton Street\Sheets\DSA BACK-UP\DA-5.dwg, Last saved: 7/30/2013, Plot Date: 7/30/2013, By: JAMES MESSANA, Plot Style: ----

APPENDIX C

PERVIOUS ASPHALT DETAIL



P.V.C. PIPE TRENCH DETAIL ITEMS 664.01XX01ER

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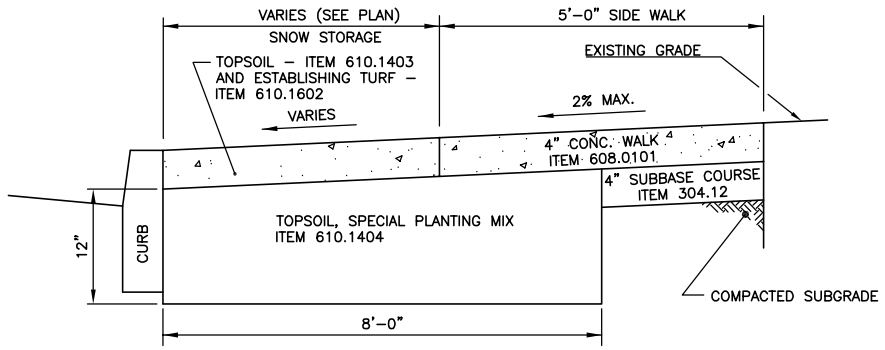
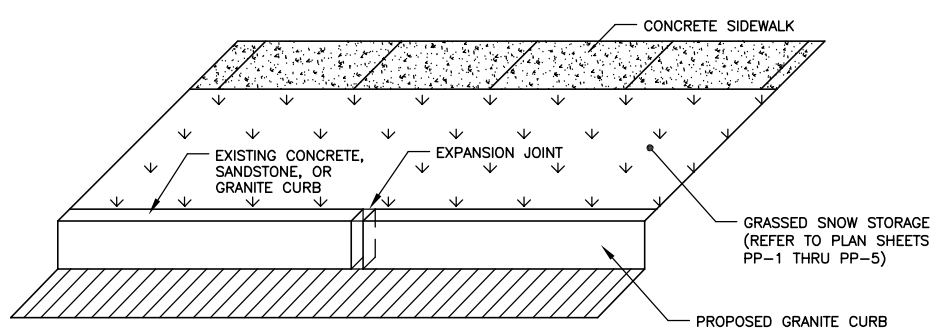


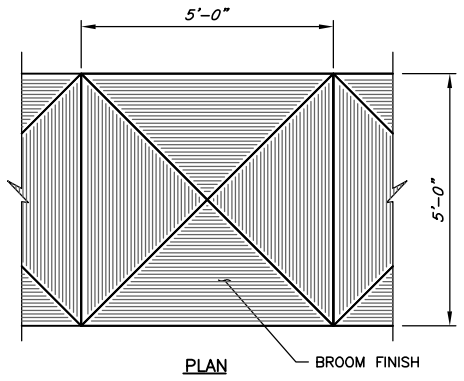
CONCRETE SIDEWALK AND SNOW STORAGE CONSTRUCTION

NOT TO SCALE



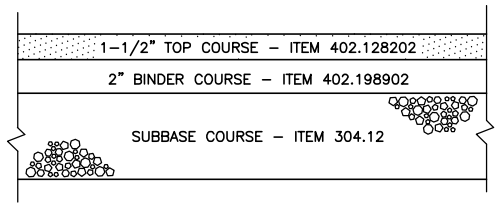
CURB TRANSITION TO EXISTING CURB

NOT TO SCALE



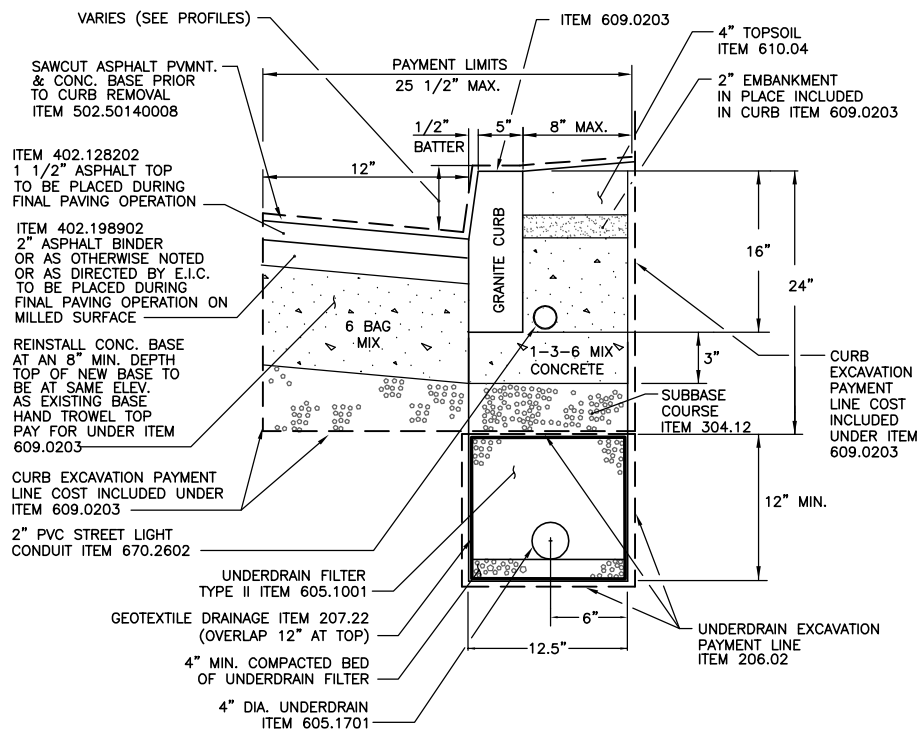
CONC. SIDEWALK TREATMENT DETAIL

NOT TO SCALE



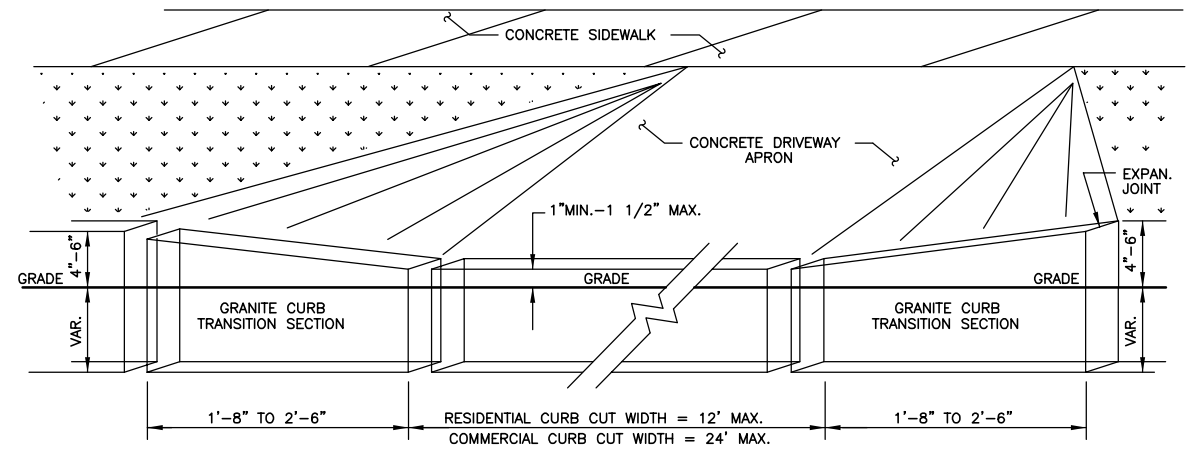
TYPICAL PARKING LOT PAVEMENT SECTION

NOT TO SCALE



GRANITE CURB AND UNDERDRAIN DETAIL IN MILL AND OVERLAY AREAS

NOT TO SCALE

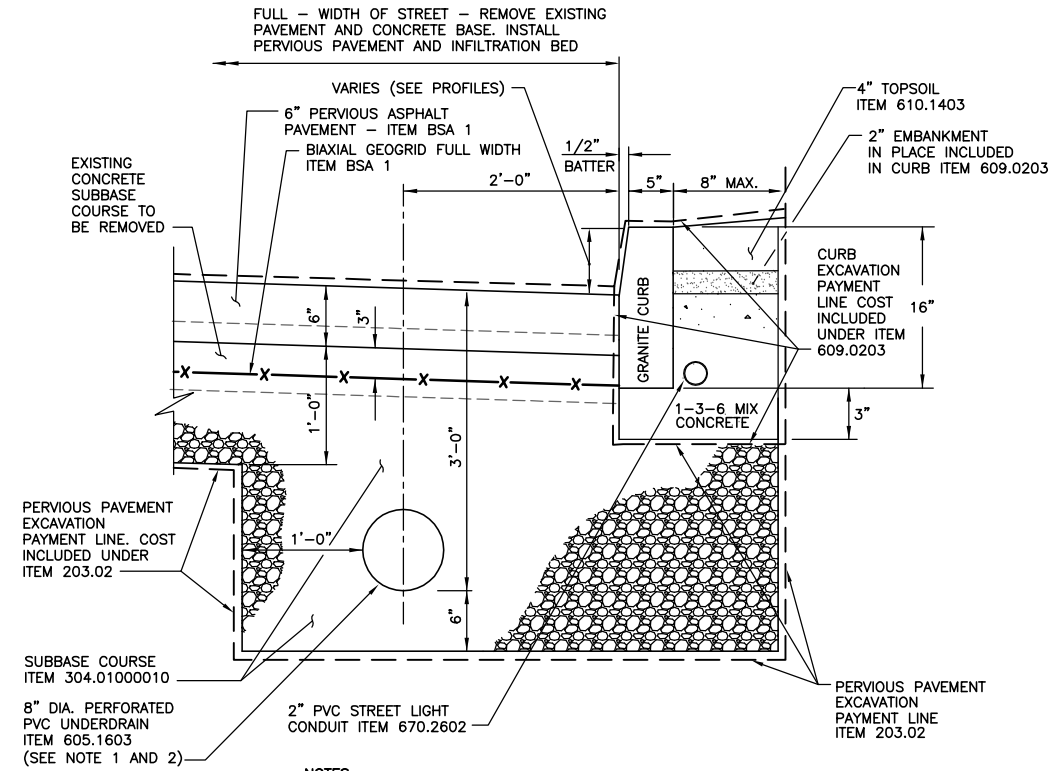


NOTE:

DRIVEWAY, SIDEWALK, & APPROACHES SHALL BE 6" THICK. COMMERCIAL DRIVEWAY, SIDEWALK & APPROACHES SHALL INCLUDE WIRE MESH, A.O.B.E.

CURB DRIVEWAY TRANSITION & APRON

NOT TO SCALE



NOTES:

1. COSTS FOR ANY NECESSARY PIPE FITTINGS (CONNECTIONS TO DRAINAGE INLETS, CLEANOUTS, ETC.) TO BE INCLUDED IN THE PRICE BID FOR ITEM 605.1603.
2. CONNECTIONS TO DRAINAGE INLETS AS SHOWN ON THE PLANS SHALL BE INCLUDED IN THE PRICE BID FOR ITEM 605.1603.

GRANITE CURB AND UNDERDRAIN DETAIL IN PERVIOUS PAVEMENT AREA

NOT TO SCALE

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P. 716.849.8739
F. 716.856.0981 (www.tvga.com)

REV. ADDENDUM NO. 1 02/22/13 GMW

TITLE **CARLTON STREET RECONSTRUCTION**

MISCELLANEOUS DETAILS III

DWG. NO. **MD-3**

COMMISSIONER STEVEN STEPNIAK
DEPARTMENT OF PUBLIC WORKS
THE DIVISION OF ENGINEERING, PARKS AND STREETS
CITY OF BUFFALO, NEW YORK

SCALE AS SHOWN
DRAWN BY TJB
CHECKED ETF

DATE 01/2013
FIELD BK.
PROJ. NO. 2010.0374.00
SHEET NO. 19

APPENDIX D

BORING LOGS

Quality Inspection Service, Inc.

Boring Log

Page 1 of 1

Boring No.: B-3

Elevation: N/A

Date	Time	Start Depth	Finish Depth	Weather	Temp	Driller
8/ 02/ 12		0 ft.	8 ft.	Sunny	75 F	JT

Drilling Method/Size of Casing: 2.25 inch ID HSA		Type of Drill Rig: Soil Max		
Type of Sampler: Split Spoon		*Sample Hammer WT/Fall:* ***140 lbs/30 inches***		
Project: Carlton Street Reconstruction		Water Level (bgs)	Date	Time
Carlton Street (Various Addresses)		1) NA		
Location: Buffalo, NY		2)		

Depth (ft)	Sample Number	Blows on Sampler	"N" Value	Sample Recovery	Classification of Soil/Rock Materials
					0.4' Topsoil
1	S -1	4 7			Black-brown fine-coarse SAND, little Silt
		6 7	13	1. 0'	trace Roots, dry (FILL)
2					
					Tan-brown fine SAND, little-some Silt, moist
3	S -2	7 7			
		9 10	16	1. 5'	
4					
					Red-brown Clayey SILT, trace Sand, moist
5	S -3	10 9			
		7 15	16	2. 0'	
6					
					Gray-brown, Clayey SILT, trace Sand, trace
7	S -4	16 14			Gravel, moist
		17 20	31	1. 8'	
8					
9					Boring Complete @ 8.0 feet
10					
11					
12					
13					
14					

bgs= below ground surface

Quality Inspection Services, Inc., 37 Franklin Street, Buffalo, New York, 14202, Tel: 716-853-2611

Quality Inspection Service, Inc.

Boring Log

Page 1 of 1

Boring No.: B-4

Elevation: N/A

Date	Time	Start Depth	Finish Depth	Weather	Temp	Driller
8/ 02/ 12		0 ft.	8 ft.	Sunny	80 F	JT

Drilling Method/Size of Casing: 2.25 inch ID HSA		Type of Drill Rig: Soil Max		
Type of Sampler: Split Spoon		*Sample Hammer WT/Fall:* ***140 lbs/30 inches***		
Project: Carlton Street Reconstruction		Water Level (bgs)	Date	Time
Carlton Street (Various Addresses)		1) NA		
Location: Buffalo, NY		2)		

Depth (ft)	Sample Number	Blows on Sampler	"N" Value	Sample Recovery	Classification of Soil/Rock Materials
1	S -1	4 7	15	0. 4'	0.2' Topsoil Black-brown SILT, little fine-coarse Sand, dry (FILL)
2		8 7			
3	S -2	5 6	12	1. 5'	Tan-brown fine SAND, little Silt, moist
4		6 7			
5	S -3	11 9	21	1. 8'	Red-brown Silty CLAY, trace Sand, moist
6		12 16			
7	S -4	11 15	33	N A	Red-brown, Clayey SILT, trace Sand, moist
8		18 22			
9					Boring Complete @ 8.0 feet
10					
11					
12					
13					
14					

bgs= below ground surface

Quality Inspection Service, Inc.

Boring Log

Page 1 of 1

Boring No.: C-2

Elevation: N/A

Date	Time	Start Depth	Finish Depth	Weather	Temp	Driller
8/ 02/ 12		0 ft.	3 ft.	Sunny	80 F	JT

Drilling Method/Size of Casing: 2.25 inch ID HSA		Type of Drill Rig: Soil Max		
Type of Sampler: Split Spoon		*Sample Hammer WT/Fall:* ***140 lbs/30 inches***		
Project: Carlton Street Reconstruction		Water Level (bgs)	Date	Time
Carlton Street (Various Addresses)		1) NA		
Location: Buffalo, NY		2)		

Depth (ft)	Sample Number	Blows on Sampler	"N" Value	Sample Recovery	Classification of Soil/Rock Materials
1					Asphalt pavement:
					1.25-inch top course
					2.75-inch base course
2	S -1	3 3		1. 5'	6.75-inch concrete
		6 7	9		Black fine SAND, tr. Silt, tr. Gravel, wet (FILL)
3					Tan-brown fine SAND and Silt, wet
4					Boring Complete @ 3.0 feet
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

bgs= below ground surface

Quality Inspection Service, Inc.

Boring Log

Page 1 of 1

Boring No.: C-3

Elevation: N/A

Date	Time	Start Depth	Finish Depth	Weather	Temp	Driller
8/ 02/ 12		0 ft.	3 ft.	Sunny	80 F	JT

Drilling Method/Size of Casing: 2.25 inch ID HSA		Type of Drill Rig: Soil Max		
Type of Sampler: Split Spoon		*Sample Hammer WT/Fall:* ***140 lbs/30 inches***		
Project: Carlton Street Reconstruction		Water Level (bgs)	Date	Time
Carlton Street (Various Addresses)		1) NA		
Location: Buffalo, NY		2)		

Depth (ft)	Sample Number	Blows on Sampler	"N" Value	Sample Recovery	Classification of Soil/Rock Materials
1	S -1	4 4	9	1. 5'	Asphalt pavement:
		5 4			1.0-inch top course
2					2.5-inch base course
					Brown & gray fine-med. GRAVEL, tr. Silt (FILL)
					Tan-br. fine SAND, tr. Silt, wet
3	S -2	5 5	5	1. 0'	Red-brown Silty CLAY, wet
4					Boring Complete @ 3.0 feet
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					

bgs= below ground surface

Quality Inspection Services, Inc., 37 Franklin Street, Buffalo, New York, 14202, Tel: 716-853-2611

APPENDIX E

POROUS PAVEMENT SIZING CALCULATIONS

TVGA CONSULTANTS

CALCULATION SHEET
SHEET NO._____OF_____

JOB TITLE	Fruit Belt Redevelopment		
JOB NO.	2010.0374.00		
CALCULATED BY	GMW	DATE	7/30/2013
CHECKED BY		DATE	

WATER QUALITY VOLUME CALCULATION

Item Sheet No. 1 of 1

Calculations performed in accordance with New York State Stormwater Management Design Manual, August 2010. Section 4.2

Data:

Drainage Area, A	5.90	acre	
Rainfall, P =	0.85	in.	Refer to Figure 4.1
Impervious %, I	36.00	%	

WQv = ((P) * (Rv) * (A)) / 12 NYS Stormwater Management Design Manual, pg. 4-2

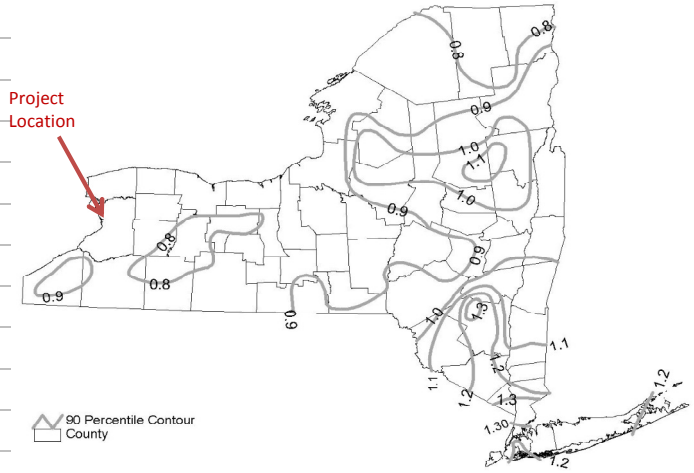
WQv = water quality volum (in acre-feet)

P = 90% Rainfall Event Number (see figure 4.1)

Rv = runoff volume = 0.05 + 0.009 (I), where I is percent impervious cover **Rv =** **0.37**

A = site area in acres (Contributing area)

Figure 4.1 90% Rainfall in New York State (NYSDEC, 2000) NYS Stormwater Management Design Manual, pg 4-2



WQv = 0.156 acre-feet

WQv	**=**	**6808**	**CF**
10% WQv	**=**	**681**	**CF**
25% WQv	**=**	**1702**	**CF**
50% WQv	**=**	**3404**	**CF**
75% WQv	**=**	**5106**	**CF**

TVGA CONSULTANTS

CALCULATION SHEET
SHEET NO._____OF_____

JOB TITLE	Fruit Belt Redevelopment		
JOB NO.	2010.0374.00		
CALCULATED BY	GMW	DATE	7/30/2013
CHECKED BY		DATE	

POROUS PAVEMENT SIZING CALCULATION

UNIT: ( )

Item Sheet No. **1** of

Calculation performed in accordance with New York State Stormwater Management Design Manual, August 2010. Section 5.3.11

A_p = Required Porous Surface = V_W / (n x d_t) NYS Stormwater Management Design Manual, pg. 5-122

V_W = design volume = WQ_V =	6808	CF	
n = porosity of gravel bed / reservoir =	0.40		
d_t = depth of gravel bed / reservoir =	1.74	FT	* average depth based on plan detail

A_p = Required Porous Surface =	9782	SF